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(54) Cooking utensils

(57) A composite metal sheet cooking utensil such as a cooking pot or frying pan comprises a core 10 of a metal having relatively good heat conductivity such as aluminum, copper, common quality steel etc., coated on one or both sides with a relatively thin layer such as 11 of a more corrosion resistive metallic material such as stainless steel, titanium etc., the layers being bonded to one another across the bottom surface of the cooking utensil and some distance upwardly the lower portion of the cooking utensil wall. The space 20 in the side wall is filled with a gas such as air. An inner layer 12 similar to layer 11 may be provided. A folded beam 13 applied with adhesive may connect the top edge portions of the utensil.

The cooking utensil is manufactured by deep drawing a laminated circular blank and the layers can be soldered together where appropriate before or after deep drawing to provide a lamination.

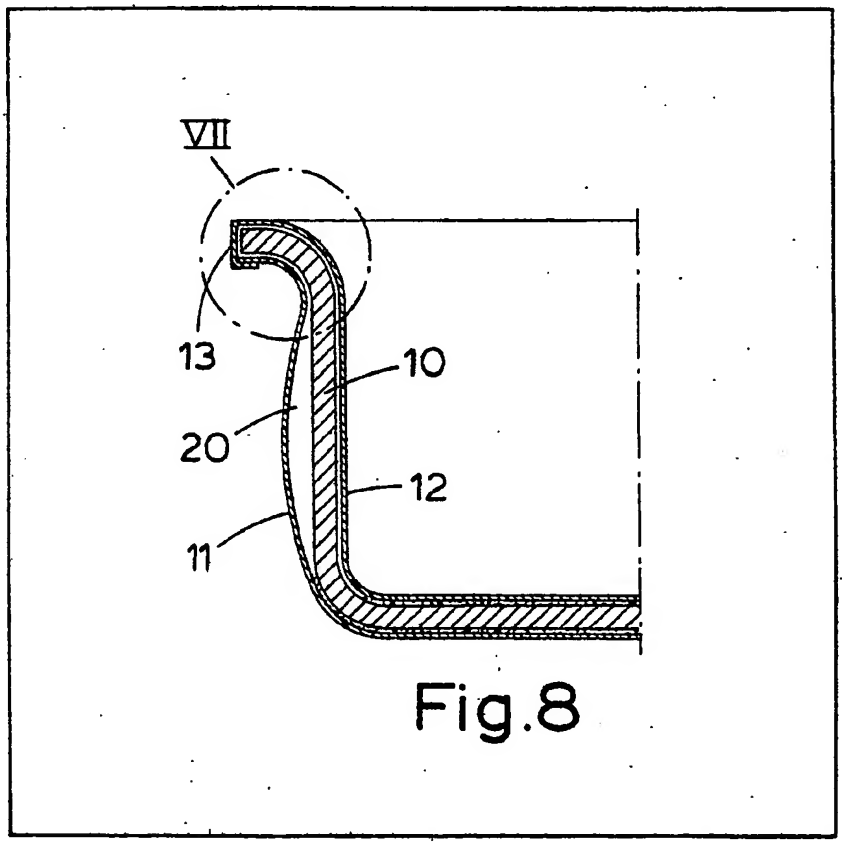

Fig.8

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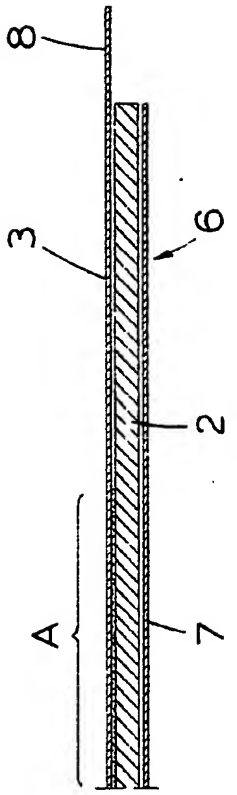

Fig.2

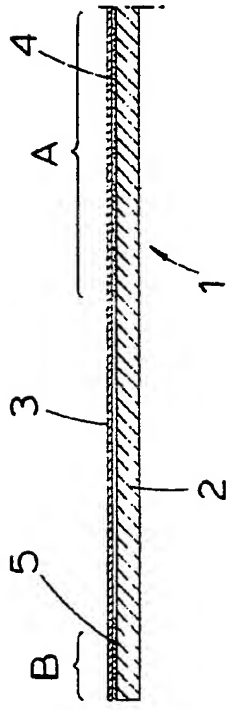

Fig.1

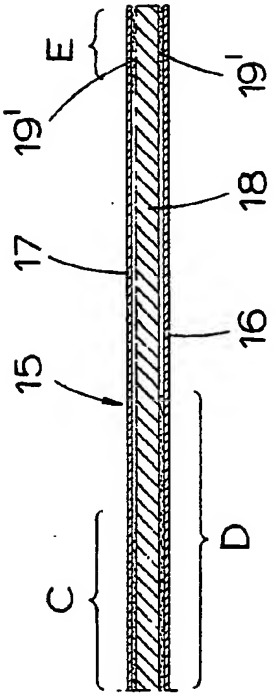

Fig.4

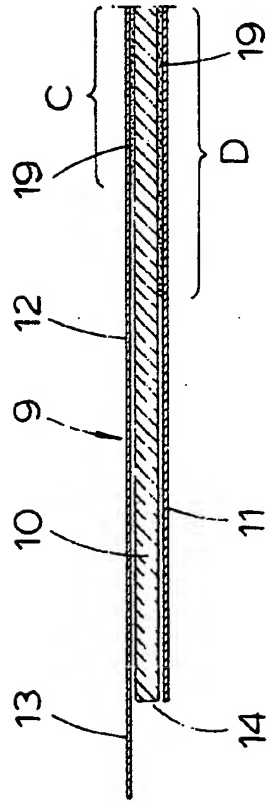

Fig.3

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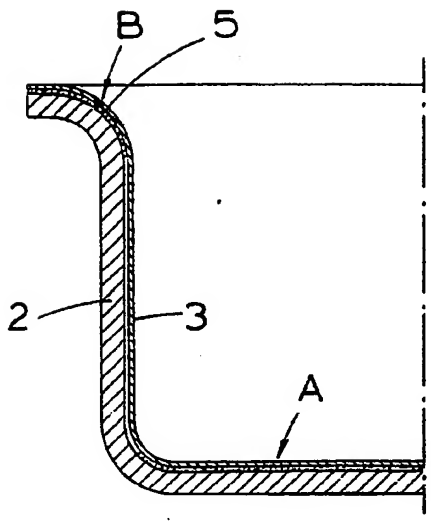

Fig.5

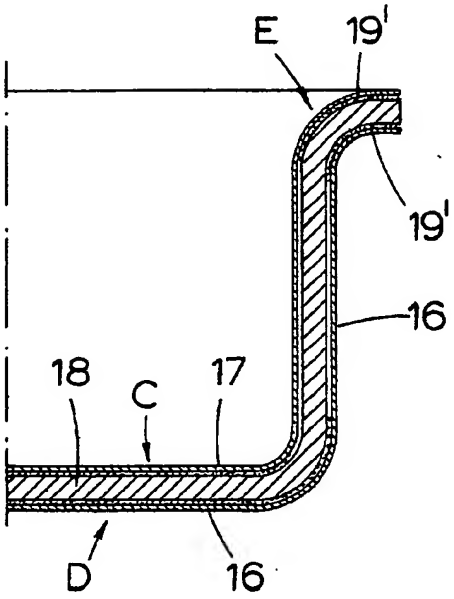

Fig.6

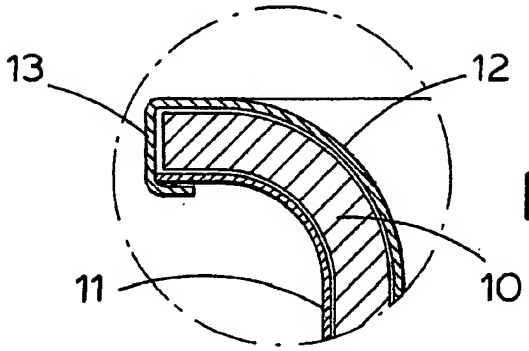

Fig.7

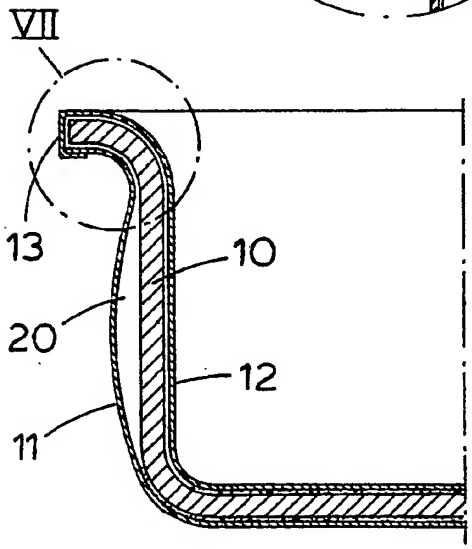

Fig.8

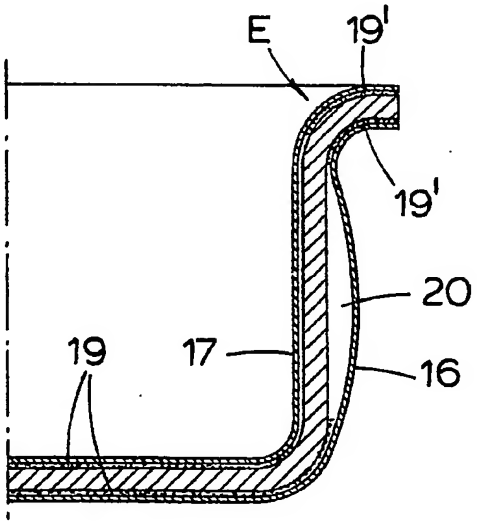

Fig.9

SPECIFICATION

Composite metal sheet cooking utensil and manufacturing method and laminated blank therefore

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to composite metal sheet cooking utensils and a method for manufacturing such utensils and more particular laminated cooking pots, frying pans or the like built up of a core material such as aluminum, copper, common quality steel, coated on one or both sides with a relatively thin layer of a more corrosion resistive material such as stainless steel, titanium and others.

2. Description of the Prior Art

Cooking utensils made of enamel coated steel sheet, aluminum or stainless steel all have their advantages and drawbacks. It is known to experts in the art that a cooking utensil made of a laminated blank is more advantageous in use than a cooking utensil made of a homogeneous material. By way of example reference is made to a statement in the periodical "Aluminio" 1973 pages 367-381: "Il pentolame di allumino problemi e futuro" and an article in Metal Progress May 1975 "The Countertop Range" by William Moreland.

When a laminated cooking utensil (composite metal sheet cooking utensil) is heated through the bottom, the temperature in the side wall will also increase and the outer diameter of the pot will increase so that the bottom will not be strained contrary to what is the case with a cooking utensil made of stainless steel and having an extra thick bottom. A cooking utensil having a heat conducting metal layer on the side wall can, therefore, have a relatively thinner aluminium layer or copper layer in the bottom than what is necessary in a non-laminated cooking utensil of stainless steel. Therefore, cooking utensils can be produced having a better temperature sensitivity and cooking efficiency than traditional cooking utensils of stainless steel.

It is known that cooking utensils can be manufactured of a composite blank prepared by rolling together at high temperature a common quality steel sheet and two stainless steel sheets. This product, however, is not particularly popular in Europe because it is liable to burn the contents of the utensil as most of the heat transfer is concentrated to the ring-shaped area along the peripheral portion of the bottom.

Laminated materials for cooking utensils can be produced e.g. by "cladding". However, a sufficiently strong bonding between e.g. aluminum and stainless steel is difficult to obtain because both metals have relatively thick oxide layers. A cladding method which has got some technical importance is rolling at high temperature and vacuum. A lamination (clad) of aluminum and stainless steel can also be made by explosion cladding but this method is still more expensive than vacuum rolling.

Cooking utensils with very useful quality can be produced by laminating sheets of copper and stainless steel or aluminum and stainless steel but the price for the product is very high. A lamination (a composite sheet) consisting of a core sheet of aluminum coated on both sides with 0,38 mm (0.15") stainless steel costs three times as much as a corresponding blank of stainless steel.

In deep drawing operation of cylindrical utensils from laminated blanks consisting of material sheets having different modules of elasticity such as stainless steel and aluminum which are bonded together across their entire contact surface, it frequently happens that the bonding between the lamination layers fails or that the weakest layer cracks. This phenomenon cannot be controlled during deep drawing so that the amount of wreckage can be rather great.

Laminations cannot be produced by brazing in rolling mills. Soldering of single circular blanks (rondels) across the whole surface is more expensive than rolling together at high pressure and temperature because the outfit is expensive and so is the soldering agent. Laminated circular blanks produced by soldering are difficult to deep draw and the amount of rejects is still higher than for rolled lamination.

A drawback in using laminated material is that laminated discard, cutting and trimming metals (composite sheets) are difficult to sell to steel mills or steel foundries.

Summary of the Invention

An object of this invention is to provide a cooking utensil of the art stated above which has a good heat transfer through the entire bottom and less heat loss through the wall than what is the case in conventional cooking utensils.

Another object of the invention is to provide a cooking utensil which can be manufactured at a more reasonable price than the formerly known cooking utensils of laminated material.

A third object of the invention is to provide a cooking utensil which can be shaped by deep drawing without risk of cracking of the lamination layers in the cooking utensil wall.

A further object of the invention is to provide a laminated cooking utensil blank which reduces the amount of laminated discard to a minimum.

It is also an object of the invention to provide a cooking utensil built up of laminated material at a reasonable price and in such a manner that the lamination process can be carried out by the producer of the cooking utensil.

A cooking utensil according to the invention is characterised substantially by the fact that the lamination layers are fixedly bonded to one another over the bottom surface and somewhat upwardly the side wall. Lamination layers can also be fixedly connected to one another along the top portion of the wall. The outer layer can be "inflated" across a portion of the wall height so

that an insulating space is provided between the outer layer and core layer of the wall. The bonding between the inner layer and the core layer can be less in radial and possibly in axial extension than between the core layer and the outer layer. The bonding between the lamination layers is preferably attained by soldering (brazing). The bonding at the top edge of the cooking utensil can be provided by folding the outermost portion of the inner layer or the outer layer possibly also using an adhesive. Alternatively, the connection at the top edge can be provided by laminating an annulus shaped peripheral portion of the blank in a similar way as for the bottom surface.

A method according to the invention comprises the features that individual circular component blanks (rondels) are provided with soldering agent or the like and possibly soldering flux across the central portion thereof corresponding to the bottom and the lower portion of the wall of the cooking utensil, whereupon the circular blanks are deep drawn simultaneously in one and same drawing press, whereupon soldering is carried out by heating. Soldering or brazing can also be carried out before deep drawing.

In a laminated circular blank for making a cooking utensil according to the invention the lamination layers are molecularly connected with one another across a central, circular zone and optionally along a ring-shaped peripheral zone. In a laminated round blank comprising three or more lamination layers one of the outer layers can be loosily mounted (not soldered together with the remaining layers).

When a cooking utensil in accordance with the invention is produced a circular blank sheet, e.g. of aluminum and a corresponding sheet of stainless steel are covered with flux agent and soldering agent in such a manner that only inthe bottom portion and a portion of the wall of the finished cooking utensil a molecular bonding will be provided. Deep drawing can be carried out before or after brazing.

A substantial advantage of this invention is that cracking during deep drawing of the laminated blank is reduced to a minimum because the bonding only extends over a less portion of the wall. Since the blanks are laminated over the portions only comprising the bonding, cuttings and trimmings of the blank material are practically free for soldering metal and the single layers of the discarded material are not bonded to one another so that they can be sorted easily and sold. Cooking utensil blanks can be made by the cooking utensil producer himself as it is not particularly difficult to coat the ready cut circular blanks with foils of soldering metal and flux agent across the areas where the bonding is to be brought about. Heating takes place preferably after deep drawing and more preferably at pressure. Heating can be provided by means of medium frequent or high frequent induction. If desirable, deep drawing can be performed after soldering. Sealing of the outer edge can be carried out before or after deep drawing. The sealing can be made by ultra sonic welding, folding or glueing.

As already mentioned, in accordance with an advantageous embodiment of the invention, the wall of the cooking utensil can be "inflated" after deep drawing and sealing of the edges, so that an insulating space is provided between the outer layer of stainless steel and the inner layer of aluminum or copper. In this manner a laminated cooking utensil is provided having a good head conductivity in the bottom and the wall wherein the wall is effectively insulated at the outside.

Other materials than aluminum and copper can be used as heat conducting layers, such as common quality steel. In addition to brazing other bonding processes can be used, such as ultra sonic welding, friction welding, adhesive bonding etc.

Brief Description of the Drawings

The invention will be disclosed more fully in the following with reference to the drawings, wherein

Figure 1 is a cross section of a half part of a round blank for a cooking utensil in shape of a lamination of two layers,

Figure 2 is a corresponding cross section through a round blank consisting of three layers.

Figure 3 is a cross section through a round blank consisting of three layers with the inner layer and outer layer bonded in different extension to the core layer, and

Figure 4 resembles Figure 3 apart from the edge portion.

Figure 5 is a cross section through a half part of a cooking utensil produced from the round blank of Figure 1, and

Figure 6 a corresponding cross section through a cooking utensil made from the blank according to Figure 4.

Figure 7 shows a folded seam along the top portion of a cooking utensil, and

Figures 8 and 9 are cross sectional views of cooking utensils made of blanks according to Figure 3 and 4, respectively, but with an "inflated" side wall.

Description of the Preferred Embodiments

Figures 1 and 2 are cross sectional views of circular blanks, so-called rondels. Figure 1 shows a blank in shape of a lamination 1 consisting of a main sheet 2 of material having relatively good heat conductivity, such as copper or aluminum, and a relatively thin sheet 3 of stainless steel. The lamination sheets 2 and 3 are fixedly bonded to one another across a central circular area A and an annulus shaped periperhal area B, at which locations a soldering agent or welding agent 4, 5 is placed between the sheets. The round blank according to Figure 2 departs from the blank according to Figure 1 by the fact that the lamination 6 in addition to the above mentioned sheets 2 and 3 has a thin outer sheet 7 of stainless steel loosely connected (not soldered) to

the core sheet 2. Further, the inner sheet 3 has a free peripheral portion 8 for providing a folded seam (Figure 7).

Figure 3 shows a lamination blank 9 having a core sheet 10 of aluminum or copper and an outer sheet 11 and an inner sheet 12 of stainless steel. The inner sheet 12 is bonded to the core sheet across a central circularly shaped area C provided with a soldering agent 19 extending radially somewhat beyond the bottom of the cooking utensil to be produced. The outer sheet 11 is bonded to the core sheet 10 across a corresponding central circularly shaped area D having remarkably greater radial extension than the area C. The inner sheet 12 has a free peripheral edge portion 13 without the lamination 14 for provision of the folded seam as shown in Figure 7.

Figure 4 shows substantially the same blank 15 as Figure 3 except that both outer sheets 16 and 17 are bonded to the core sheet 18 along a peripheral annulus shaped portion E across which portion soldering agent 19' is located between the sheets.

Figure 5 shows a cross section through a cooking utensil made of the round blank according to Figure 1. The bottom area where the sheets are bonded to one another is denoted by A and a corresponding peripheral area is denoted by B, as in Figure 1.

Figure 6 is a cross sectional view of a cooking utensil made from the blank according to Figure 4. It appears clearly that the bonding between the core sheet 18 and the inner sheet 17 (area C) covers the bottom portion and the rounded transitions towards the wall, whereas the bonding D between the core sheet 18 and the outer sheet 16 extends somewhat higher along the wall of the cooking utensil. Of course, the inner bonding zone can be of the same extension as the outer bonding zone D or higher.

Figure 8 shows a cooking utensil made from the blank of Figure 3 with the connection between the top edge portions of the sheets 10, 11, 12 made by a folded seam as shown in Figure 7. The folded seam can be applied with an adhesive agent. The space between the core sheet 10 of the wall and the outer sheet 11 of the wall is inflated so that an interspace 20 filled with gas or air is provided. The cooking utensil according to Figure 9 is practically identical with the cooking utensil of Figure 8 except that the cooking utensil according to Figure 6 is made from the blank according to Figure 4.

The cooking utensil is shaped by simultaneously deep drawing of two, three or four round blanks. Brazing can be performed in such a way that a foil of brazing metal precoated with flux agent is placed between each lamination sheet. The heating is preferably carried out at a pressure and can be provided by medium frequent or high frequent induction. The deep drawing operation can be performed before or after brazing.

In the description two of the layers have been denoted as inner sheet and outer sheet, respectively, but it should be understood that the invention also covers embodiments where the round blank is turned upside down so that the top sheet will become the bottom sheet and vice versa. In an embodiment wherein one of the lamination sheets is not fixedly bonded across the bottom to the basis sheet, the effect can be obtained that the bottom will "be lifted" to some extent from the cooking plate when a certain temperature is attained so that the heat transfer to the contents of the cooking utensil than will be reduced.

CLAIMS

1. Composite metal sheet cooking utensil (in the following called cooking utensil) such as cooking pot, frying pan or the like, built up of a core material sheet of a metal having relatively good heat conductivity such as aluminum, copper, common quality steel etc., coated on one or both sides with a relatively thin sheet of a more corrosion resistive material, such as e.g. stainless steel, titanium and others, characterised in that the lamination sheets are bonded to one another over the bottom surface and lowermost part of the side wall of the utensil.

2. Cooking utensil according to claim 1, characterised in that the lamination sheets are bonded to one another along the top edge portion of the wall.

3. Cooking utensil according to claim 1 or 2, characterised in that the space between the outer sheet and the core sheet is "inflated" over a portion of the wall height so that an insulating space is shaped between the outer sheet and the core sheet of the wall.

4. Cooking utensil according to claim 1, 2 or 3, having a core sheet, an inner sheet and an outer sheet, characterised in that the bonding between the inner sheet and the core sheet is of less radial and possibly axial extension than between the core sheet and the outer sheet.

5. Cooking utensil according to any of the preceding claims, characterised in that the bonding between the sheets comprises soldering agent.

6. Cooking utensil according to any of the claims 1 and 3—5, characterised in that at the top edge of the utensil the edge portion of the inner sheet or the outer sheet is folded over the edge portion of the other sheet, possibly using an adhesive, to provide a folded seam.

7. Method for producing a cooking utensil according to any of the preceding claims, characterised in that the individual round component blanks are laminated together (bonded together) before deep drawing.

8. A method of producing a cooking utensil according to any of claims 1—6, characterised in that the individual round component blanks are provided with soldering agent and if necessary flux agent over the central portion thereof corresponding to the bottom and the lowermost portion of the wall of the cooking utensil, and placed upon one another whereafter the blanks

are deep drawn simultaneously in one and same drawing press, whereupon soldering is carried out by heating, preferably at pressure.

9. Round lamination blank for making cooking utensils according to any of claims 1—6, comprising two or three lamination sheets, characterised in that the lamination sheets are molecularly bonded to one another over a central circular zone only.

10. A lamination blank according to claim 9, characterised in that the lamination sheets are bonded together along ring-shaped peripheral portions thereof.

11. A round blank according to claim 9, with three or more lamination sheets, characterised in that one of the outer layers is loosily fitted (not bonded) to the other ones.

12. Cooking utensils substantially as herein described with reference to the accompanying drawings.

13. Methods of producing a cooking utensil substantially as herein described.

14. Lamination blanks for making cooking utensils substantially as herein described with reference to the accompanying drawings.

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